**Unit 4 (Cell Energy): Topics, Objectives, and Specific Learning Targets**

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| **Topic** | **Objective (with VA SOL in parentheses)** | **Specific Learning Target** | **Where did I learn this?**  (What resources should I use to study?) | **How well do I know this?**  (scale of 1 to 3, with 3 indicating a high level of understanding) |
| ATP | 1. You will be able to describe the role of adenosine triphosphate (ATP) in energy storage and release within living systems. | a. You will be able to describe the basic structure of the ATP molecule. |  |  |
| b. You will be able to explain how energy is released from ATP and how ATP is broken down into ADP + Pi. |  |  |
| Photosynthesis | 2. You will be able to describe the energy transfers involved in the process of photosynthesis and the purpose of photosynthesis in living systems | a. You will be able to identify the sun as the primary source of energy for all living organisms. |  |  |
| b. You be able to describe the purpose of photosynthesis in living organisms. |  |  |
| c. You will be able to differentiate between characteristics of the light reactions / light dependent reactions and the dark reactions / light independent reactions / Calvin cycle. |  |  |
| d. You will be able to explain the role of chlorophyll in capturing light energy as the first step of the light reactions. |  |  |
| e. You will be able to identify the locations of the light vs. dark reactions in the chloroplast. |  |  |
| f. You will be able to describe the transformation of energy from light energy to chemical energy stored in the bonds of the glucose molecule. |  |  |
| g. You will be able to summarize the reactants and products of the photosynthesis reaction in words and chemical formulas. |  |  |
| Cellular Respiration | 3. You will be able to describe the energy transfers involved in the process of cellular respiration and the purpose of cellular respiration in living systems. | a. You will be able to describe the purpose of cellular respiration in living organisms. |  |  |
| b. You will be able to differentiate between characteristics of glycolysis, Kreb’s cycle, and the electron transport chain. |  |  |
| c. You will be able to identify the locations of the three steps in cellular respiration within the cytoplasm and mitochondria. |  |  |
| d. You will be able to describe the transformation of energy from one form of chemical energy (glucose) to another (ATP). |  |  |
| e. You will be able to summarize the reactants and products of the cellular respiration reaction in words and chemical formulas. |  |  |
| f. You will be able to compare and contrast the photosynthesis and respiration reactions and describe them as a cycle. |  |  |
| Energy Strategies | 4. You will be able to distinguish between the metabolic strategies used by autotrophs and heterotrophs. | a. You will be able to define the terms “autotroph” and “heterotroph” and identify examples of each |  |  |
| b. You will be able to describe which types of organisms (autotrophs vs. heterotrophs) use photosynthesis vs. cellular respiration. |  |  |